PATENT SPECIFICATION

Inventor: HARRY JOHN RUSSELL.

687,226

Date of Application and filing Complete Specification: Feb. 23, 1951.

No. 4447/51.

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Index at acceptance:—Class 81(ii), A3.

COMPLETE SPECIFICATION

Orthodontic Locking Device

ERRATUM

SPECIFICATION NO. 687,226

Page 1, line 1, *for* "Baker and Company Incorporated" *read* "Baker & Company Incorporated".

THE PATENT OFFICE,
15th July, 1953

DS 31984/1(8)/3476 150 7/52 R

types have been proposed and used to correct the irregularity of teeth. In most cases, the locks are advantageously positioned on the anterior surface of the teeth for easier application, but project outwardly therefrom to such a degree as to cause discomfort to the patient. Some locks heretofore known are provided as a plurality of unassembled co-operating parts and necessitate the presence of the patient for complete assembly of the lock since the assembly is usually completed when the arch bow is positioned anteriorly of the teeth. Such locks are usually placed into a locking position either by a locking member moved transversely with respect to a tooth, or by securing an arch bow to a locking structure by tying or otherwise fastening the arch bow to the locking structure in a series of operations before the arch bow is correctly positioned and locked. In the case of the transverse locking action, the area of contact of the lock with the arch bow is usually large and thereby appreciably restrains the inherent resiliency of the arch bow. Also, a large area of contact of the arch bow with a lock structure interferes with correct positioning of the locks on teeth when the degree of tooth irregularity is great. Locks which require a series of operations for securing an arch bow to the lock are undesirable since the patient is subjected to the applica-

[*Price* 2/8]

lies substantially flat against the tooth. For a better understanding of the invention,

Figure 1 is a plan view of a dental arch equipped with an orthodontic lock according to the invention and as applied to a single tooth;

Figure 2 is an enlarged front elevational view of an orthodontic lock according to the invention and as applied to a single tooth;

Figure 3 is a perspective view of a feature of the invention;

Figure 4 is a cross-sectional view along lines 4—4 of Figure 3, including an elevational view of another feature of the invention;

Figure 5 is a perspective view of a further feature of the invention;

Figure 6 is a perspective view of an assembled orthodontic lock according to the present invention;

Figure 7 is a diagrammatic side view of a modification of the invention;

Figure 8 is a sectional side view of another modification of the invention; and

Figure 9 is a front elevational view of a further modification of the invention.

According to the invention, there is provided a substantially flat orthodontic lock comprising two main structures which interlock and cooperate with each other to provide a vertical locking action, said structures

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COMPLETE SPECIFICATION

Orthodontic Locking [illegible]ice

We, BAKER AND COMPANY INCORPORATED, a corporation organised under the laws of the States of New Jersey, of 113, Astor Street, Newark 5, New Jersey, United States of America, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention deals with an orthodontic device and more particularly with an orthodontic lock for securing an arch bow to the teeth for the correction of irregular teeth on the dental arch.

Orthodontic arch bow locks of various types have been proposed and used to correct the irregularity of teeth. In most cases, the locks are advantageously positioned on the anterior surface of the teeth for easier application, but project outwardly therefrom to such a degree as to cause discomfort to the patient. Some locks heretofore known are provided as a plurality of unassembled co-operating parts and necessitate the presence of the patient for complete assembly of the lock since the assembly is usually completed when the arch bow is positioned anteriorly of the teeth. Such locks are usually placed into a locking position either by a locking member moved transversely with respect to a tooth, or by securing an arch bow to a locking structure by tying or otherwise fastening the arch bow to the locking structure in a series of operations before the arch bow is correctly positioned and locked. In the case of the transverse locking action, the area of contact of the lock with the arch bow is usually large and thereby appreciably restrains the inherent resiliency of the arch bow. Also, a large area of contact of the arch bow with a lock structure interferes with correct positioning of the locks on teeth when the degree of tooth irregularity is great. Locks which require a series of operations for securing an arch bow to the lock are undesirable since the patient is subjected to the application procedure for very long periods which add to his discomfort.

All orthodontic locks heretofore known are associated with one or more of the above-mentioned disadvantages.

It is an object of the present invention to provide a completely assembled orthodontic lock prior to the application of an arch bow thereto. It is another object of the present invention to provide an orthodontic lock which secures an arch bow thereto by a single operation. It is a further object of the present invention to provide an orthodontic lock which does not appreciably restrain the inherent resiliency of an arch bow and which lies substantially flat against the tooth. For a better understanding of the invention,

Figure 1 is a plan view of a dental arch equipped with an orthodontic lock according to the invention and as applied to a single tooth;

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According to the invention, there is provided a substantially flat orthodontic lock comprising two main structures which interlock and cooperate with each other to provide a vertical locking action, said structures

[*Price* 2/8]

Price 4s 6d

Price 25p

Price [illegible]

being retained in cooperating position by a retaining means which allows limited vertical movement to prevent said structures from complete disengagement once the lock has been completely assembled. The vertical locking action is advantageous in that it enables the application of the lock to a tooth regardless of the degree of irregularity of the teeth on the dental arch. The entire lock is dimensioned so that the contact area with an arch bow is comparatively small, which allows the arch bow to retain its inherent resiliency to a great extent and also provides the arch bow with sufficient free length to follow an irregular contour of the teeth on the dental arch depending upon the predetermined correction plan for the teeth. An outstanding advantage of the invention is the fact that the arch bow is applied to the locks only after the lock is assembled so that a single locking operation is sufficient to secure said arch bow to said locks. This allows a considerable saving of time in positioning the arch bow, which lessens the discomfort of the patient and enables easier manipulation of the arch bow since the arch bow may be adjusted without entire disengagement of the cooperating lock components.

According to Figure 1, the invention comprises an orthodontic lock 1 positioned anteriorly of a tooth 2 by means of a tooth band 3 to which the lock is secured, preferably by soldering. A plurality of locks, each relating to a single tooth, are similarly positioned and secured, and each lock retains a wire arch bow 4 substantially in conformity with a dental arch. The ends of the arch bow wire are anchored to a suitable anchor means 5, *e.g.* anchor tubes, which are soldered to tooth bands secured to a pair of molars as illustrated.

Figure 2 is an enlarged front elevational view of a single lock positioned according to Figure 1 and particularly illustrating said lock in locked position with the arch bow 4 secured thereto. The lock itself comprises two main structures including a metal lock base 6 constructed for vertical sliding engagement with a cooperating locking member or metal post 7. The post 7 is provided with either a substantially centrally located aperture 8 formed through said post, or with an aperture 8 and a notch 9 at the lower end of said post. The components of the lock are substantially flat and of a size too small for efficient handling with the fingers and, therefore, the assembly of the lock is facilitated by the provision of said aperture which is shaped to cooperate with an assembling tool or key having an end insertable within said aperture. The assembling tool and aperture herein referred to are particularly described and illustrated in Patent No. 450,553. Although the aperture 8 is primarily used for assembling purposes, it may also be used for opening and closing said orthodontic lock. However, for opening purposes to disengage an arch bow wire from the lock, the aperture is not necessary because any suitable pointed instrument may be utilized in conjunction with the notch 9.

Figure 3 illustrates the unassembled lock base 6 in perspective. The base 6 may be manufactured from flat stock material, preferably noncorrosive metal, by blanking out a T-shaped structure and forming the sides 10 and 11 and the bottom portion 12 substantially perpendicular to the body portion 13, or by swaging a small metal block to form said sides and subsequently machining the structure to the desired dimensions.

The inner surfaces 14 and 15 of the sides 10 and 11 are undercut or machined to cooperate or interlock in vertical sliding engagement with the interlocking sides of the metal post 7 as illustrated by Figure 5. A drill hole 16 is formed through an upper central portion of the body 13 so that at a later assembling stage a retaining means 17, *e.g.* a pin, shown in elevation in Figure 4, may be hammered into or otherwise secured to said drill hole. Alternatively, the drill hole 16 may be dispensed with and a retaining means may be formed integral with the body 13, at the location of the hole 16, by swaging or otherwise forming a projection as a retaining means. A suitable transverse groove 18 is formed, preferably machined, into the bottom portion of the base 13 perpendicular to said locking member to provide the space which the arch wire 4 will ultimately occupy when the lock and arch bow are assembled and positioned. The groove 18 may have any appropriate dimensions depending upon the type of arch wire used. For example, if a twin arch bow comprising two wires is utilized, the groove may be substantially broader than in the case where a single wire is positioned edge-wise into said groove. In the latter case, the groove could be dimensioned for sufficient depth to contain said edge-wise positioned wire. In any case, the groove is dimensioned to correspond substantially with the arch bow wire used so that the arch bow is immovable in its final locked position.

Fig. 5 is a perspective view of the metal post 7 showing the bevelled sides 19 and 20 which cooperate with the machined surfaces 14 and 15 of Figure 3 to provide a vertical movement of the post 7. The aperture 8 and notch 9 have been hereinbefore more particularly described. The post 7 is provided with a groove 21 machined centrally along the post between and parallel to the sides 19 and 20. Said groove 21 extends slightly below the aperture 8 and terminates so that a substantial portion of the post below the aperture is not grooved. Having provided the lock base 6 and the post 7, the

lock is assembled as shown in Figure 6 by positioning the post 7 into the lock base 6 through the top of the lock base 6 so that the bevelled sides of the post cooperate with the machined sides of the lock base. It is apparent from the drawings that the post in locked position rests upon the platform or end 12. Once the sides of the lock base and the post are in sliding engagement, the post is moved vertically until the aperture 8 rests over the drill hole 16. At this stage, a retaining member 17, e.g. a pin, may be secured into the drill hole. However if desired the retaining member may be secured to the drill hole prior to the introduction of the post and the post may then be introduced into sliding engagement with the slides of the lock base by bending the end 12 to allow entry of the post and then bending the end 12 back to its normal position.

The retaining member 17 is positioned so that it projects from the drill hole for a distance sufficient for cooperation with the groove 21. When the retaining member is secured and the post positioned, the lock itself is completely assembled and is provided with a limited vertical movement since the downward movement is limited by the end or platform 12 and the upward movement is limited by the retaining member. It is apparent from the drawings that the upward movement of the post is arrested by contact of the lower ungrooved portion of the post which acts as a stop or abutment for the pin 17.

If a swaged projection is used as a retaining member to replace the aforementioned drill hole and pin, the bottom end 12 of the lock base 6 may be bent from the perpendicular to allow entry of the post 7 between the sides 10 and 11 and afterwards bent back to the perpendicular.

The completely assembled lock is subsequently positioned and soldered to a tooth band. When a plurality of assembled locks are positioned on individual teeth of the dental arch, it is then only necessary to position an arch wire into the groove 18 and slide the post 7 downwardly over the arch wire thereby locking the arch wire with the single downward movement. After assembly, the lock components are not normally disengageable, which is advantageous since the small lock parts are not subject to loss or do not present any added handling operations in order to secure an arch bow to said lock.

Figure 7 illustrates a modification of the lock base 6, said modification being particularly applicable to the end portion 12 of the lock base, which is provided with an angular extension 22 having an inner side 23 parallel to a face of the post 7 so that upon downward movement of the post 7 its lower side or face frictionally contacts the inner side 23. The frictional contact between the post and the extension 22 is advantageous in that the lock, after the arch wire is secured thereto, is held in closed position not only the force of the resilient wire against the post, but also by frictional contact of the post and the extension 22 below the groove 18. Therefore, vertical movement of the post is substantially impeded to the extent that the arch bow is not dislodged from the lock unless desired, in which case a tool, key or the like instrument is necessary to give vertical movement to said post to disengage the arch bow.

Figure 8 is a sectional side view of another modification of the invention wherein the lock base structure 24 is provided with vertical interlocking sides above and below a transverse groove 25 positioned substantially equidistant between its top and bottom, said groove having appropriate dimensions for containing an arch bow wire placed edgewise therein. The bottom portion or platform 12 hereinbefore described is eliminated in this modification and a retaining means 26, e.g. a retaining pin, is substituted therefor. The locking member 27 is provided with a short groove 28 for engaging the pin 26 to prevent further downward movement of the locking member. The pin 26 cooperates with the groove 28 and the pin 29, which is similar to the pin 17 hereinbefore described, cooperates with the groove 30, which is substantially similar to the groove 21 hereinbefore described, to limit the vertical or upward and downward movement of the locking member 27. The lock is assembled by sliding the locking member 27 upward between the interlocking sides of the lock base structure 24 until the pin 29 in the groove 30 stops further upward movement, and the pin 26 is then positioned or secured to the lock base 24 so that a downward movement of the locking member 27 is limited by the contact of the pin 26 with the groove 28.

Figure 9 illustrates still another modification of the present invention wherein only a single retaining pin 31 is necessary to allow a limited vertical movement and prevent complete disengagement of the lock structure once the lock has been completely assembled. The post 32 is provided with an elongated slot 33 through said post, said slot having terminals 34 and 35 and being positioned substantially centrally of said post and parallel to the sides thereof. The lock is assembled by first engaging the lock post with the lock base and then securing the pin 31 above the groove for the arch wire and in cooperating contact with the slot 33 so that when the lock is opened the pin 31 contacts the terminal 35 of the slot 33 to prevent further upward movement. When the lock is closed, the pin 31 contacts the terminal 34 of the slot 33 to prevent further downward movement.

It is to be understood that the illustrations are considerably enlarged and slightly exaggerated to clearly show the lock structures and the assembled lock is actually dimensioned to form a substantially flat structure against a tooth.

The present invention is not to be limited to specific structures set forth since it is apparent that slight modifications of the structures described are possible without departing from the scope of the invention.

What we claim is:—

1. An orthodontic lock comprising in combination a lock base structure and a locking member, said locking member being provided with vertical bevelled sides, an aperture, a vertical groove along said locking member intermediate of said sides, said lock base structure being provided with bevelled sides engageable with said bevelled sides of said locking member for vertical sliding movement of said locking member, an end portion for restricting downward movement of said locking member, and a retaining means engageable with said groove of said locking member for limited upward movement of said locking member and for preventing disengagement of said locking member from said lock base structure, said lock base structure having a transverse groove perpendicular to said locking member for containing an arch bow wire.

2. An orthodontic lock as claimed in claim 1, wherein the locking member is provided with a notch on one end thereof and the locking member retaining means comprises a pin.

3. An orthodontic lock as claimed in claim 1, wherein the lock base structure is provided with retaining means integral therewith for engagement with the groove of the locking member.

4. An orthodontic lock as claimed in claim 3, wherein the locking member is formed with an aperture therethrough for co-operation with a tool insertable therein to vertically move said locking member.

5. An orthodontic lock as claimed in claim 2, wherein the notch is formed at the lower end of said locking member for co-operation with an instrument insertable therein for disengaging an arch bow wire from said lock.

6. An orthodontic lock as claimed in claim 1, wherein the end portion of said lock base structure has an angular form comprising a side parallel to the locking member and is positioned to frictionally contact said locking member thereby to impede vertical motion of the latter.

7. An orthodontic lock as claimed in claim 1, wherein two vertical grooves are provided along said locking member intermediate of said sides, a retaining means consisting of a pin is engageable with one of said grooves for limiting upward movement of said locking member, a retaining means consisting of a pin is engageable with the other groove for limiting downward movement of said locking member, and the transverse groove is positioned substantially equidistant between the top and bottom of said lock base structure.

8. An orthodontic lock as claimed in claim 1, wherein the lock base structure is provided with undercut sides engageable with the sides of the locking member, and there are provided retaining means engageable with the vertical groove of said locking member for limiting upward movement of said locking member and for preventing disengagement of said locking member from said lock base structure.

9. An orthodontic lock as claimed in claim 8, wherein an elongated vertical slot is provided for engagement with the retaining means.

10. An orthodontic lock substantially as hereinbefore described with reference to the accompanying drawings.

Dated this 23rd day of February, 1951.

HASELTINE, LAKE & CO.,
28, Southampton Buildings,
London, W.C.2, England; and
19-25, West 44th Street,
New York, U.S.A.
Agents for the Applicants.

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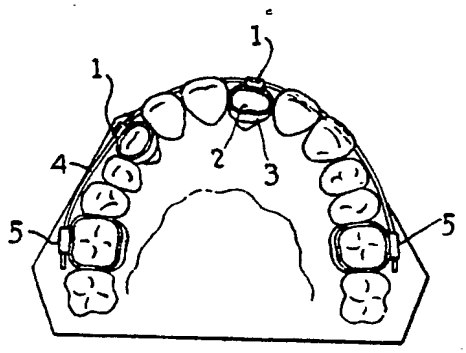
Published at The Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies may be obtained.

Fig.1.



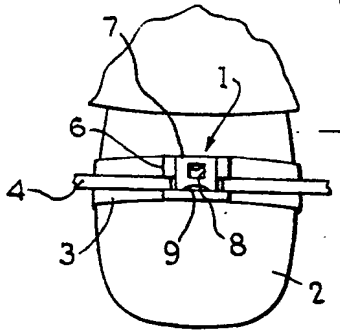


Fig.2.

Fig.3.

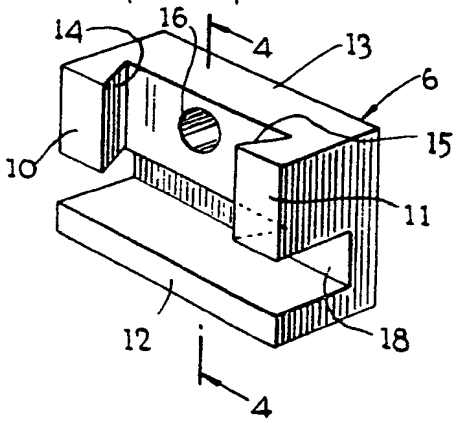
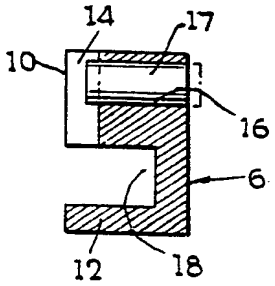


Fig.4.



687,226 COMPLETE SPECIFICATION

2 SHEETS

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SHEETS 1 & 2

Fig.5.

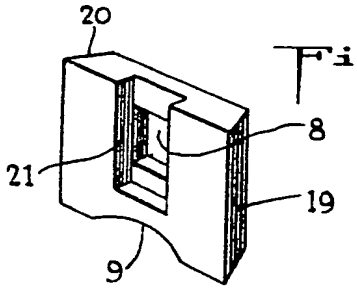


Fig.6.

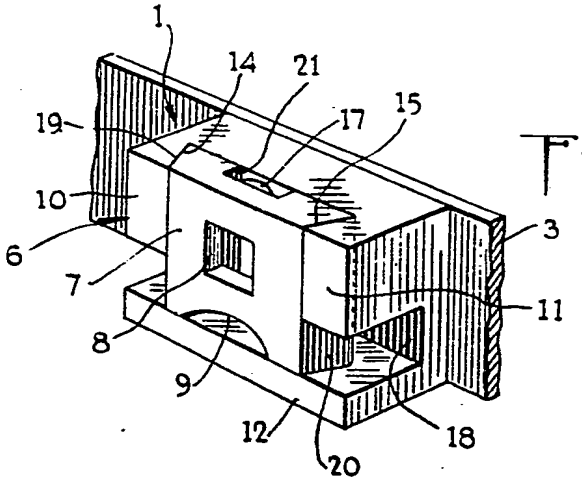


Fig.9.

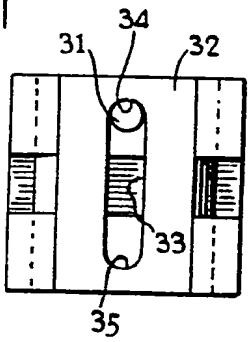


Fig.7.

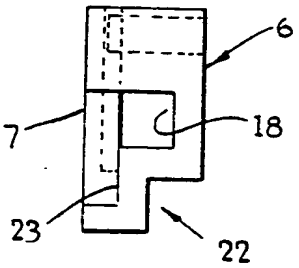
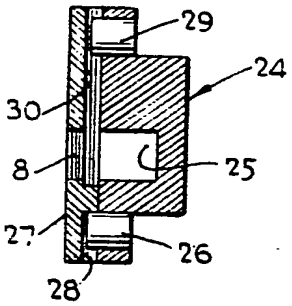


Fig.8.



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2 SHEETS This drawing is a reproduction of the Original on a reduced scale.
SHEETS 1 & 2

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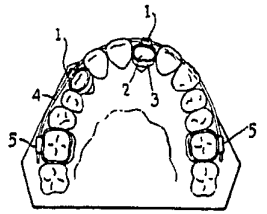

Fig.2.

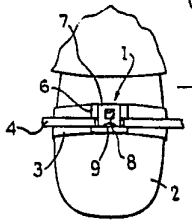

Fig.3.

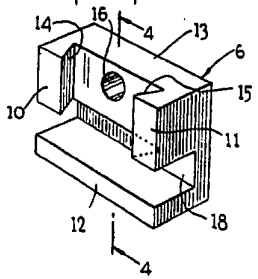

Fig.4.

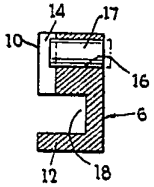

Fig.5.

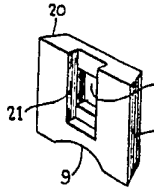

Fig.6.

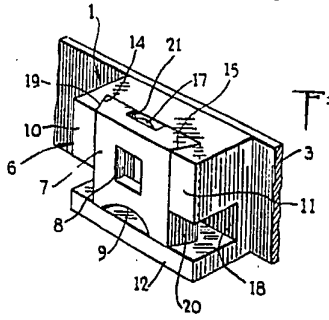

Fig.7.

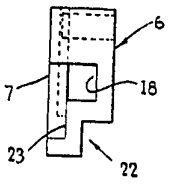

Fig.8.

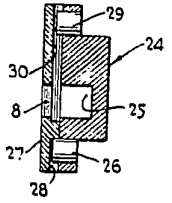

Fig.9.